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Flip-chip bonded defective resin encapsulated semiconductor die replacement method for direct chip attachment package - leaving part of the encapsulation resin and part of solder bump electrodes, enclosed in resin, on substrate by milling planarisation after mechanical die removal to form mesa base on substrate

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Number of Countries: 005 Number of Patents: 006

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Main IPC	Week
EP 548603	A1	19930630	EP 92120518	A	19921202	H01L-021/60	199326 B
JP 5251516	A	19930928	JP 91344822	A	19911226	H01L-021/60	199343
US 5355580	A	19941018	US 92976619	A	19921116	H05K-003/39	199441
EP 548603	B1	19950927	EP 92120518	A	19921202	H01L-021/60	199543
DE 69205134	E	19951102	DE 605134	A	19921202	H01L-021/60	199549
			EP 92120518	A	19921202		
US 5488200	A	19960130	US 92976619	A	19921116	H05K-001/18	199611
			US 94255596	A	19940608		

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Cited Patents: 05Jnl.Ref

Patent Details:

Patent	Kind	Lan	Pg	Filing	Notes	Application	Patent
EP 548603	A1	E	8				
Designated States (Regional): DE FR GB							
US 5355580	A		7				
EP 548603	B1	E	9				
Designated States (Regional): DE FR GB							
DE 69205134	E				Based on	EP 548603	
US 5488200	A			8	Div ex	US 92976619	
					Div ex		US 5355580

Abstract (Basic): EP 548603 A

The method involves replacing a semiconductor chip (4) bonded face down to a substrate (2) by bump electrodes (6) with the space between chip bottom and substrate filled with encapsulation resin (14). The chip is mechanically removed from the substrate with a cutting end mill (26).

The surface of the resin and the bump electrodes remaining on the substrate are planarised pref. with a finishing end mill to a height about half the original bump electrode height. Another chip is aligned and bonded to the bump electrodes on the substrate, using other bump electrodes attached to the replacement die. The space between the bottom surface of the replacement chip and the substrate is filled with encapsulation resin.

ADVANTAGE - Simple chip replacement with minimal chemical or mechanical damage to substrate or circuits and components; maintains reliable connection after replacement, with improved thermal stress resistance.

Dwg.2/6

Abstract (Equivalent): EP 548603 B

A method for replacing a semiconductor chip (4,4A) bonded face down to a substrate (2) by bump electrodes (6,6A) with the space between the bottom surface of said semiconductor chip and said substrate being filled with an encapsulation resin (10), comprising the steps of: mechanically removing said chip from said substrate, planarising the surface of said resin and said bump electrodes remaining on said substrate, bonding another chip to the bump electrodes on said substrate through the use of other bump electrodes, and filling the space between the bottom surface of said another chip and said substrate with an encapsulation resin.

Dwg. 6/6

Abstract (Equivalent): US 5488200 A

An interconnect structure, comprising:

a first substrate with a surface;

a pattern of multiple conductive pads defining an area on the surface of the first substrate;

conductive bumps with first ends positioned on the conductive pads, and second ends of the bumps defined by a second surface approximately parallel to and above the surface of the first substrate and which defines the flat, distal ends of the bumps wherein the second surface is mountable to an electronic device having additional conductive bumps; and a first layer of an encapsulant filling around the bumps in the volume defined by the area of the pattern of conductive pads and between the first substrate surface and the defining second surface.

Dwg. 4/6

US 5355580 A

The space between the bottom surface of a semiconductor chip and a substrate is filled with an encapsulation resin. The chip is mechanically removed from the substrate. The surface of the resin is planarised, the bump electrodes remaining on the substrate.

Another chip is bonded to the bump electrodes on the substrate through the use of other bump electrodes. The space between the bottom surface of the other chip and substrate is filled with an encapsulation resin. The removal of the chip is accomplished by milling.

USE - For replacing a semiconductor chip bonded face down to a substrate by bump electrodes, esp. in a direct chip attachment (DCA) packaging system.

Dwg. 4/6

Derwent Class: U11; U14

International Patent Class (Main): H01L-021/60; H05K-001/18; H05K-003/39